NEW ZEALAND ANTARCTIC RESEARCH

PROGRAMME 1983-84

NEW ZEALAND ANTARCTIC RESEARCH PROGRAMME

and report of 1982-83 programme

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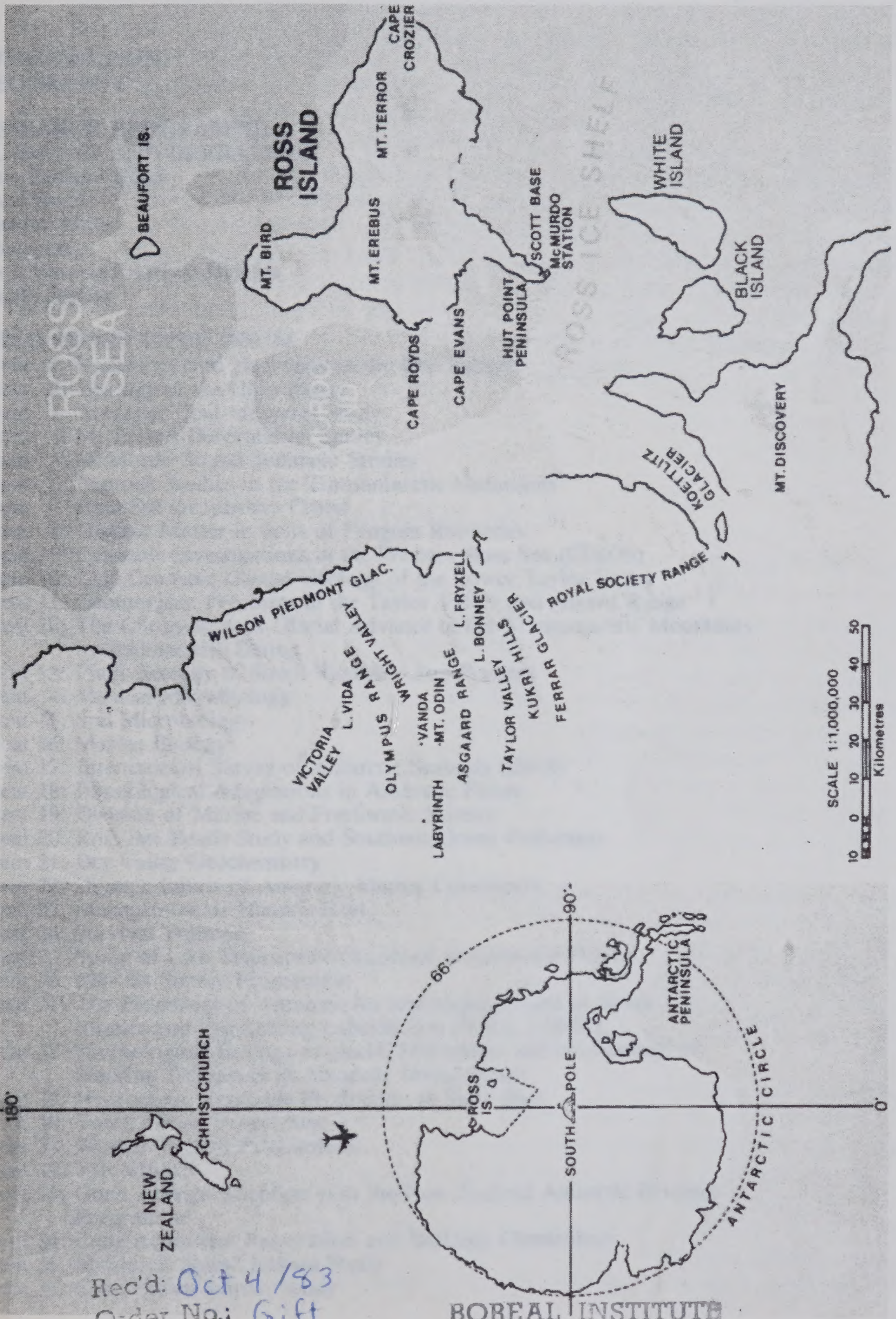

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Map — Ross Island and Dry Valleys Region Inside Front Cove

INTRODUCTION

Geographical proximity forged the first links between New Zealand and Antarctica . For almost a century, many Antarctic expeditions have used New Zealand as a staging point en route to the southernmost continent. An event of considerable significance occurred in 1923, when the British Government, by an Order-in-Council, placed that region of Antarctica, known as the Ross Dependency, under the jurisdiction of the Governor-General of New Zealand

Since first establishing Scott Base in 1957, New Zealand has maintained a continuous presence under the direction of the Antarctic Division of the Department of Scientific and Industrial Research. New Zealand's early recognition of the likely impact of man on the Antarctic environment has enabled us to play a leading role amongst the international Antarctic community in formulating and implementing conservation measures. In order to fully appreciate the measures already operative and those under consideration, and why restraints are necessary, it is important to understand the geography of the continent, the nature of New Zealand's Antarctic programme and the significance of the Antarctic environment.

GEOGRAPHY

The Antarctic continent covers nearly 14 million sq km, about the size of the combined areas of the United States and Australia. Approximately 98% of its surface is covered by a thick ice sheet up to a depth of some 4,000 metres in places. This volume of about 25 million cubic km represents over 90% of the world's ice and contains some 72% of its fresh water. The ice cap is the major contributor in making Antarctica the highest of all continents with a mean elevation of about 2,500 metres. In addition to its long area, Antarctica has over 2 million sq km of permanent ice shelves, while around the continent the sea ice varies in area from about 3 million sq km in the late summer to a maximum of about 20 million sq km in late winter.

Despite its huge reservoir of frozen water, Antarctica is the world's largest desert. The mean annual precipitation over the whole continent amounts to a mere 10 cm with a water equivalent of only about 3 cm.

Near the coast the ice sheet thins out and its shape and movement is increasingly affected by the sub-glacial relief. Along about half of the coast the ice feeds into the ice shelves with thicknesses generally of between 200 and 1,300 metres. Even off-shore the continent is distinctive in form. The continental shelf has a mean width of only about 30 km and in some places does not exist at all. The shelf is most notable for its great depth at its outer edge; 400/600 metre depths are common and in the Ross Sea the edge lies at some 800 metres.

There are few areas of the continent that are ice free. These are generally called the "oases", the largest of which is located in Victoria Land near the coast of the Ross Sea and known as the "dry valleys". Here post-glacial processes have begun. Soils have started to form, lichens, mosses and algae exist, rivers flow and lakes lose much of their ice cover during the short summer. The sediments of these lakes hold clues to the climatic history of the area for they contain the products of glacial erosion and retreat and encroachment of the sea. Off-shore too, in the Ross Sea, the glacial and marine deposits form a stratigraphic column of great importance in studying the history of the ice sheet.

NEW ZEALAND ANTARCTIC RESEARCH PROGRAMME (NZARP)

PLANNING AND OPERATION

The Ross Dependency Research Committee (RDRC) is responsible to the Minister of Science and Technology for formulating the New Zealand Antarctic Research Programme. The Committee comprises representatives of Divisions of the Department of Scientific and Industrial Research, Department of Lands and Survey, the National Museum, the Royal Society of New Zealand, New Zealand Universities, the Chiefs of Staff of the New Zealand Armed Forces, the Ministry of Foreign Affairs, non-Government agencies and scientific disciplines with Antarctic interests.

Antarctic Division, DSIR, is responsible for all logistics and the detailed planning and implementation of the New Zealand Antarctic Research Programme, involving up to 300 personnel during the summer season.

The Division employs staff and obtains supplies and equipment for all Government projects. University scientific programmes are financed and equipped from University funding sources. The operation and control of all projects undertaken in Antarctica comes under the jurisdiction of the Officer-in-Charge, Scott Base, who is responsible to the Director, Antarctic Division, DSIR.

NEW ZEALAND BASES

Scott Base, located at Pram Point near Cape Armitage on Ross Island, was established in 1957 to house New Zealand's first Antarctic expedition. This was to support two major events, the Trans-Antarctic Expedition (TAE) and the research programmes we had committed ourselves to as an important part of the International Geophysical Year (IGY). Since then Scott Base has been continuously occupied by support staff and scientists and the New Zealand research programme has been progressively expanded. In order to adequately provide for the increasing numbers of personnel participating in research activities, a base rebuilding programme was commenced in 1976, which includes construction of a new laboratory, power house, and administration and accommodation facilities. This project, to be completed in the mid-1980s, should meet New Zealand's needs in the Antarctic for many years to come.

Up to 12 staff members stay over the winter at Scott Base to sustain important continuous scientific observations. The base is one in a chain of international observatory stations used for the study of upper atmosphere and earth sciences. Arrival Heights 3 km north of Scott Base is designated a Site of Special Interest (SSSI) in order to provide an electrically quiet area where we are able to monitor and record a variety of changes occuring in the lower inonsphere.

Vanda Station, situated near the shores of Lake Vanda in the dry valleys region, operates during the summer season. Vanda functions as a support base for field parties conducting research activities in the dry valleys and as a centre of meteorological, hydrological and glaciological studies designed to better understand the unique climate of the region.

Bird Station, was constructed by Scott Base personnel during the 1965/66 season. Following completion of studies on wildlife at Cape Royds, the Canterbury University Antarctic Biological Unit commenced a programme of studies on seals, Adelie penguins, McCormick skua gulls and the inter-relationships.

In the summer of 1971/72, a wet laboratory was built to facilitate the study of marine plankton and benthic research.

CAPE ROYDS

A combined biological laboratory and sleeping hut was erected in 1963 by Scott Base staff at Cape Royds, 36 km north of Scott Base on the western side of Ross Island.

This is the location of the most southerly Adelie penguin colony in the world. The rookery has been designated by SCAR and the Treaty Nations as a "Site of Special Scientific Interest".

Biologists from Canterbury University used the hut at Cape Royds for several summer seasons as headquarters for their studies on penguins, skuas and seals.

The hut has since been transported to the Wright Valley and integrated into the buildings of Vanda Station.

A smaller summer hut has been erected at Royds for visiting researchers.

Emergency Huts, fully provisioned, are maintained at Lake Fryxell, Asgard Range, Lower Wright Valley, Butter Point, Cape Evans, Cape Royds and Cape Chocolate/Salmon River for use by field parties during the summer season.

HISTORIC HUTS

On Ross Island there are three historic huts which since 1960 have been excavated and restored to an "as was" condition by New Zealand Antarctic Society volunteers and DSIR personnel, with American assistance. In 1960/61 the hut at Cape Evans, which was Captain Scott's headquarters for his last tragic expedition in 1910/13, and was the home for the Ross Sea component of Shackleton's Trans-Antarctic Expedition of 1914/17, was restored. Also the hut at Cape Royds, which was Shackleton's headquarters for his 1907/09 expedition, was made weatherproof during the 1960/61 season. Finally, in the 1963/64 season, restoration work was commenced on Scott's 1901/04 expedition hut at Hut Point.

At Cape Adare, at the northern tip of Victoria Land, are the two huts built by C. E. Borchgrevink in 1898/99 and the remains of Scott's Northern Party's hut of 1911. Scott's hut is beyond repair, but it is hopped that Borchgrevink's hut will be restored at some time in the future.

TRANSPORT

From the time of the International Geophysical Year, 1975/58, through to 1960, air support within Antarctica for the New Zealand research programme was provided by the Antarctic Flight of the Royal New Zealand Air Force.

Subsequently, generous logistics support has been available through the U.S. Antarctic Programme under U.S./N.Z. Government to Government agreement, which also provides the U.S. with base facilities in Christchurch.

During the 1982/83 season, the RNZAF will fly 14 Hercules C130 missions to Antarctica, constituting the main New Zealand contribution to the U.S./N.Z. logistics pool. The RNZAF will operate a pilot exchange scheme including helicopter crews which will be attached to the U.S. Navy VXE-6 squadron flying field missions within Antarctica. Additionally, RNZAF and New Zealand Army cargo handling teams will operate at both Christchurch and McMurdo throughout the summer.

Ground Transport: Scott Base

1D5 Caterpillar Tractor
1 D4 Caterpillar Tractor
1 920 Caterpillar FEL Tractor
3 Snow-Trac Vehicles
8 Snow-Tric Toboggans
1 Landrover
1 Dodge — 4 Wheel Drive One Ton Truck
1 International Wheeled Tractor — to be moved to Vanda Station during thi season.
1 International Crawler Tractor 500
1 Bedford Personnel Truck
2 Ford Personnel Trucks
1 Toyota Landcruiser 4×4

2 Dog Teams. Sledge dogs have been a feature of New Zealand field party transportation since the Trans-Antarctic Expedition of 1957. However, motor toboggans introduced into the 1962/63 season have superseded the dog teams on long field traverses. These "tin dogs" can cover greater distances in shorter times and haul heavier loads.

The dog population at Scott Base is now kept at about twenty — enough for two teams of nine dogs each, with reserves. The main work for the dog teams is in carrying out the annual penguin census, emergency operations, recreation and public relations activities.

1981/82 NEW ZEALAND ANTARCTIC RESEARCH PROGRAMME

1. SCOTT BASE AND ARRIVAL HEIGHTS

Scott Base sited at Pram Point on the South tip of Ross Island (latitude 77° 51'S) is New Zealand's main base in Antarctica. It provides year round support for research in geophysical and atmospheric sciences and is an important link in a global chain of observing stations, with continuing study programmes in geophysics, meteorology, seismology and upper atmosphere physics.

Scott Base Laboratory programmes will this year include:

Magnetic Studies

Continuous recordings will be made of the earth's magnetic field throughout the daily operation of two 3-component LaCour magnetograph variometers to measure three components of the earth's magnetic field. Weekly absolute observations will also be made with the aid of a proton precision magentometer.

Ionospheric Monitoring Studies

Scott Base is one station in a world network of stations which continuously records the state of the ionosphere with a vertical incidence recorder. A panoramic ionosonde, designed and constructed in New Zealand, sweeps from 1–22 megacycles in 24 seconds at 15 minute intervals to provide data from Scott Base to be used for the prediction of radio operation frequencies.

This programme is operated by the Geophysical Observatory, Physics and Engineering Laboratory (P.E.L.), D.S.I.R., Christchurch. The original P2 ionosonde installed at Scott Base was replaced last year with the new fully tranistorized equipment, IPS42. This new ionosonde is not only smaller in size but also uses 16mm film which gives more easily read values of the critical frequencies of the ionospheric layers.

Data from Scott Base ionosonde recordings spans more than two sunspot cycles and is the most extensive data base for ionospherics in Antarctica.

Ionospheric D-Region Observations

This project is sponsored by the Physics Department of Canterbury University. Using a high powered transmitter at Scott Base sending pulses into the ionosphere and a receiving antennae array at Arrival Heights, the project involves a number of different experiments aimed at investigating the D-Region. The project is planned to last a period of 10–15 years — at least one solar cycle.

During the season a team from Canterbury University will carry out tests and servicing, plus the installation of some new equipment. Operation and regular reporting will be the responsibility of Scott Base laboratory staff.

Precipitation of Electrons in the D-Region

Sponsored by the Physics Department of Victoria University this project involves installation and operation of radio receivers at Scott Base to record whistlers (dispersed sets or radio frequencies travelling through the magnetosphere from one hemisphere to another). Scientists from Victoria University responsible for this programme will also spend time at Vanda Station conducting preliminary Magnetotelluvic surveys. Their instruments will be run by solar panels.

Meteorology

The N.Z. Meteorological Service will continue the Scott Base observing programme and make additional radiation measurements, including data analysis. Scott Base also contributes to the meteorological network operated by the U.S. Navy in Antarctica. Local climatological studies will also be made in conjunction with field parties, each of which is required to provide daily reports on location weather. Meteorological observations will also be made from Vanda Station in the Dry Valleys region. A co-operative programme with the University of Alaska involving the study of atmospheric turbidity will be conducted.

The Meteorological Service intends to expand their programme at Scott Base from 1984/85 onwards. One technical officer will visit Antarctica during this current season for the purposes of site selection, inspection of instruments and installation of specialized instrumentation.

Seismology

The Scott Base observatory programme is concerned with recording both long/short period seismic waves from earthquakes throughout the world and was set up in 1963 as part of the World Wide Seismic Study (WWSS) involving some 26 stations established around the globe. New Zealand is responsible for other similar stations located in Wellington, Rarotonga, Cook Islands, and Apia and coordinated by the Seismological Observatory, Geophysics Division, DSIR, Wellington. Data from Antarctica and all other world wide stations is collected and collated at a central respository in Colorado and is available to all researchers.

Seismic and audio studies will also be made as an integral part of the International Mt. Erebus Seismic Study (IMESS). Under this programme, initiated and co-ordinated by Dr. Philip Kyle of the Institute of Mining and Technology, New Mexico,in conjunction with the University of Alaska, the Japan National Institute of Polar Research and Victoria University of Wellington, a series of seismic recorders sited on Mt. Erebus at various locations are monitored at Scott Base by radio telemetry recording on a continuous basis, seismic activity occurring on or about the crater of Mt. Erebus.

Stratospheric Trace Gas Measurements

This programme was introduced last season to measure electron drifts and atmospheric gases in the E. Region or stratosphere. A scanning monochromotor installed at Arrival Heights has been in automatic operation and this unit is scheduled to be returned to New Zealand for calibration at the end of this current season and will be re-installed at Arrival Heights for operation during the 1984/85 season, The programme is sponsored by Physics and Enginerring Laboratory, DSIR.

Time System

A crystal controlled time clock installed at Scott Base by Physics and Engineering Laboratory, Geophysical Observatory, DSIR is maintained in the laboratory to provide timing accurate to 3 seconds per year and accurately controlled 50 hertz power to run the base clocks and other instrumentation.

Earth Currents

During the 1964/65 season a programme measuring electric currents in the earth was established at Scott Base, as this year was the International Year of the Quiet

Sun. Solar flares then reached a minimum as compared with the International Geophysical Year in 1957/58. Two sets of electrodes sunk 10 ft. deep through the permafrost were spaced 4,000 ft. apart, one for the north-south reading and one for the east-west reading. This electric current study, which results from variations in the earth's magnetic field, is one method of observing solar and ionospheric activity which has important effects on radio communication. Although earth current observations ceased in October 1974, one line which acts as an indicator of disturbance was retained to monitor magnetic activity. This programme is monitored by Geophysical Observatory, P.E.L., DSIR, Christchurch.

Aluminium Corrosion

The Mechanical and Engineering Department of Canterbury University have for many years conducted an analysis and comparison programme involving exposed aluminium plates. Each year these plates are installed at Scott Base and are annually returned to Christchurch where they are compared with similar strips located in other centres throughout New Zealand, for corrosive effect. Again this season, Scott Base staff will re-install the aluminium plates for a further 12 months exposure.

Physchological Studies and Counselling

This long term project involves the study of psychological characteristics of stress and isolation on the Scott Base winter team. Interviewing and counselling services will also be conducted beginning at the Tekapo Training Camp and continuing during the early part of the season. The programme is sponsored by the Psychology Department, Victoria University of Wellington and Antarctic Division, DSIR.

2. VANDA STATION

Vanda Station in the Wright Valley is New Zealand's main base on the Antarctic continent, built in 1968 to support the intensified study of the almost ice-free Dry Valleys. Vanda Station, 130 km west of Scott Base, is ideally situated for the support of summer field parties working in the Dry Valley area.

Vanda is basically a summer only station but scientific parties wintered over in 1969, 1970 and 1974. Research programmes were carried out in the fields of meteorology, seismology, aurora, upper atmosphere physics, geomagnetism and human physiology.

Vanda Station will be operational from mid October 1983 to the end of January 1984 and will be manned by a leader, field assistant, technician and assistant maintenance officer.

The N.Z. Meteorological Service technician will be responsible for making daily weather observation reports to Scott Base. During the current season new Vanda sleeping quarters erected during the 1982/83 summer season will be completed, increasing accommodation capacity for up to 12 people.

A new Dunlite wind generator mast will also be erected during the season.

FIELD PROGRAMME

The 1983/84 New Zealand Antarctic Research Programme comprises field activities involving a wide range of disciplines and sponsored by New Zealand Government Departments and the Universities of Auckland, Waikato, Wellington, Canterbury and Otago.

Most scientific events will be conducted in the McMurdo Sound, Dry Valley regions but an important geological expedition will also visit the Ohio Range in the Trans-Antarctic Mountains, and an inspection party will visit Cape Hallett.
There will be four ''international scientific field events'' involving researchers from United States and Japan, as well as New Zealand scientists. Other guest scientists working with the N.Z. programme during the season include specialists from the, People's Republic of China, Brazil and Uruguay.

EVENT 1: HYDROLOGY AND GLACIOLOGY IN THE DRY VALLEYS

Ministry of Works and Development.

This monitoring programme, has been carried out over the past decade to document long and short term climatic variations in the Dry Valleys. Short term climatic variation studies involve monitoring nine enclosed lakes (Vida, Vanda, House, Joyce, Bonney, Henderson, Hoare, Fryxell and Don Juan Pond) and the relationship between melt water run-off and summer climate is to be further pursued by installing a temporary flume and thermograph on selected melt water streams.

The Onyx River flow regime studies will this year involve some aeiral photography.

Mass balance and ablation measurements will also be taken on the Heimdall and Wright Lower Glaciers. In addition this year the stability of alpine glaciers will be investigated by a study of the snout of the Upper Victoria Glacier.

It is planned also to take some flow measurements of the river flow from the Cape Bird ice cap.

EVENT 2: GEOLOGY OF THE OHIO RANGE

Canterbury Museum

A four person sledging team will again visit the Ohio range at point 84°S where the southern end of the Trans Antarctic Mountains begins to disappear below the Polar Ice Cap.

An earlier Canterbury Museum expedition visited the region in 1979/80 and concentrated on the Lower Devonian Horlick Formation. The party will this year amplify work on the Devonian sequence and study the unusually thick coal bearing permian sequence and will follow up early discoveries of Buckeye Tillite from the 1979/80 visit with a view to seeking an explanation on its origin, and effect on local ice sheet movement.

Time permitting the expedition will also visit the Long Hills region to verify earlier geological mapping.

EVENT 3: ANTARCTIC COAL MEASURES STUDY
N.Z. Geological Survey, DSIR and
Antarctic Coal Measures Study Group of N.S.W.

This event has been postponed for one year.

EVENT 4: MT EREBUS DEFORMATION SURVEY
N.Z. Geological Survey, DSIR

Over the past three seasons a survey network has been installed and monitored around the summit caldera of Mt Erebus. The function of the survey is to detect the nature and rate of earth deformation in the summit region with the aim of establishing movement and variations of the lava lake activity.

EVENT 5: MCMURDO SOUND SEDIMENT STUDIES
Victoria University Antarctic Research Centre

Over the past three seasons Victoria University parties have carried out seismic investigations of sea floor sediments in different parts of McMurdo Sound.

Subject to safe sea ice conditions the unit this year will concentrate their studies in the Granite Harbour area where they plan to position sediment traps.

EVENT 6: BEDROCK STUDIES IN THE TRANSANTARCTIC MOUNTAINS
Victoria University Antarctic Research Centre

This three year programme is being initiated by the Victoria University unit to achieve a better understanding of the development of the Trans-Antarctic Mountains through field oriented bedrock studies.

Their programme involves detailed mapping and structural analyses to determine the relationships between basement rock units, detailed mapping and fission track data to determine the style and history of tectonism at the Trans-Antarctic Mountain front.

EVENT 7: ROSS SEA GEOPHYSICS CRUISE

D.S.I.R. Geophysics Division and U.S. Geological Survey

Utilising the facilities of the research vessel Lee chartered by the U.S. Geological Survey two N.Z. scientists will conduct seismic studies in the continental slope area of the coast of North Victoria Land and Oates Land during the January/February period.

EVENT 8: ORGANIC MATTER IN SOILS OF PENGUIN ROOKERIES

Soil Bureau, DSIR

Soil scientists from the Soil Bureau of DSIR will conduct on-site analyses of the biological and biochemical processes in guano influenced soil material and a comparison with relatively sterile soils in the Wright Valley.

They will also conduct a soil survey of Cape Bird including soil temperature and water content measurements.

EVENT 9: CENOZOIC INVESTIGATIONS IN THE WESTERN ROSS SEA (CIROS)

Victoria University of Wellington and Antarctic Division, DSIR

The CIROS project is a geological drilling programme which will span two summer seasons and will involve the drilling of four holes, two off Butter Point in New Harbour and two off Cape Roberts in Granite Harbour. The objective is to drill between 280m and 500m sub-bottom to recover core samples and provide a record of the sediments in McMurdo Sound from present day through to pre-glacial times, believed to be in the cenozoic era (60 million year b.p.). A subsequent study of cores should throw light on the development of the Antarctic ice sheet and the rise of the Trans Antarctic Mountains. Both these studies are of global interest as the growth of the Antarctic ice sheet has influenced world climate and ocean circulation and the Trans Antarctic Mountain range does not easily fit any current model of tectonic development.

The programme is an extension of earlier drilling projects in the Dry Valleys and McMurdo Sound and will involve scientists from organisations in both New Zealand and United States.

Basically this year will focus on logistic support build up for the first drilling operations scheduled to commence in 1984/85. Equipment and building materials stored at Scott Base will be moved to Butter Point and a camp erected ready for occupation in September 1984.

EVENT 10: LATE CENOZOIC GLACIAL GEOLOGY OF THE LOWER TAYLOR VALLEY.

Antarctic Division, DSIR and United States Geological Survey

This project will study the glacial history of the Lower Taylor Valley and will involve a combination of geological mapping and drilling of core samples. Subsequent analyses of the samples should help to determine the age, deposition and source of glacial drift sequence in the Lower Taylor Valley.

EVENT 11: GEOMORPHIC PROCESSES IN THE TAYLOR VALLEY AND ASGARD RANGE

University of Waikato Antarctic Research Unit

Waikato University scientists will study glacial deposits, slope forms and slope development, and the influence of rock strength and joints in the Taylor Valley, Asgard and Olympus Ranges.

EVENT 12: THE CHRONOLOGY OF GLACIAL ADVANCE IN THE TRANSANTARCTIC MOUNTAINS BY RADIOMETRIC DATING

University of Waikato Antarctic Research Unit

This project will be conducted in association with Event 11 and will involve detailed studies of surface exposures of sediments. The study programme should provide a chronology of successive Ross Ice Sheets beyond the 200,000 years already available from surface exposures.

EVENT 13: PLANT ECOLOGY OF SOUTH VICTORIA LAND STREAMS

Division of Marine and Freshwater Science, DSIR
(Taupo Research Laboratory)

The streams of the McMurdo Sound area are characterised by their environmental extremes and diverse productivity. This combination makes these streams an ideal setting for a comparative study of stream ecological processes. Studies will be conducted in the Onyx River in the Wright Valley, the Fryxell Stream in the Taylor Valley, the streams of Lake Miers and the streams of Cape Bird/Harrison Bluff.

EVENT 14: MEDICAL MICROBIOLOGY

Department of Health

Programme Postponed

EVENT 15: SOIL MICROBIOLOGY
Canterbury University

Programme postponed this season

EVENT 16: MARINE BIOLOGY
Canterbury University

Postponed this season

EVENT 17: INTERNATIONAL SURVEY OF ANTARCTIC SEABIRDS (ISAS)
University of Canterbury

ISAS is an international programme co-ordinated through the International Scientific Committee on Antarctic Research (SCAR) as a contribution to its BIOMASS programmes. New Zealand biologists have made significant contributions to ISAS over the past two seasons and this year will conduct the annual penguin census at Cape Bird and Cape Royds.

Penguin census numbers are invaluable as a baseline by which natural or man induced fluctuations can be monitored.

Cape Royds supports the most southerly Adelie penguin rookery known in Antarctica. Although the colony is close to major centres of human activity and is believed to have been affected in the past, tight controls are now exercised on access to the rookery. The project also involves an aerial photographic survey of Adelie rookeries along the McMurdo and northern Victoria Land coastlines.

EVENT 18: PHYSIOLOGICAL ADAPTATIONS IN ANTARCTIC FISHES
Zoology Department, Auckland University

Five scientists from Auckland University will continue their research programme investigating Antarctic fish neurobiology, responses to temperature stress and the measurement, tagging and relationships of fish in an area west of Cape Royds to assess growth and age structure of the population, size of the population and mobility.

EVENT 19: DIVISION OF MARINE AND FRESHWATER SCIENCE
McMurdo Sound Phytoplankton Studies
N.Z. Oceanographic Institute, DSIR

Postponed this season.

EVENT 20: ROSS SEA BEACH STUDY AND SOUTHERN OCEAN POLLUTANTS

Geology Department, University of Auckland

Not active this season.

EVENT 21: DRY VALLEY GEOCHEMISTRY

Japan Polar Research Association, sponsored by Antarctic Division, DSIR

A four man Japanese expedition working from Vanda Station in the Dry Valleys will continue their geochemical studies of salts in the fresh water but highly saline lakes of the region.

EVENT 22: ORGANIC INPUTS OF ANTARCTIC MARINE CONSUMERS

Institute of Nuclear Sceinces, DSIR

Cancelled

EVENT 23: MANAGEMENT OF HISTORIC SITES

Antarctic Division, DSIR

Maintanance and supervision of the historic sites in the Ross Dependency has been part of the N.Z. Antarctic Research Programme for over twenty years. In 1983/84 staff of Antarctic Division will continue to monitor the state of the historic huts on Ross Island at Winters Quarters Bay, Cape Evans and Cape Royds. Besides undertaking basic maintenance where necessary close supervision and interpretative services will be provided for visitors to the sites. Control of access to the huts will be exercised by the Officer in Charge, Scott Base.

EVENT 24: SURVIVAL TRAINING

Antarctic Division, DSIR

Antarctic Division, DSIR will provide three specialist personnel as members of the joint N.Z./U.S. S.A.R. team to conduct a series of survival training courses for members of the N.Z. and U.S. Antarctic field programmes. Instruction will also be given to aircrew and Coast Guard personnel.

EVENT 25: STUDY OF LOW TEMPERATURE ENZYMES IN ANTARCTIC FISHES

Biochemistry Department, Victoria University

The purpose of this event will be to obtain blood samples from Antarctic cod and by a scientific process separate the enzyme glutathione S-transferase. This enzyme is important in protecting blood from cold temperatures and also acts as a defence mechanism against toxic substances. The study will endeavour to determine why this particular enzyme is cold resistant and to what extent it acts as a detoxification agent.

EVENT 26: 1983/84 SURVEY PROGRAMME

Department of Lands & Survey

Two surveyors from the Department of Lands & Survey will provide survey assistance to a number of events throughout the season including the establishment of control points for detailed mapping of the Cape Bird area, McMurdo Ice Shelf movement study, CIROS drilling programme, McMurdo Sound sea ice movement studies and Lower Taylor Valley Winkie drilling programme Event 10.

EVENT 27: THE PROPERTIES OF ANTARCTIC ICE AND MEASUREMENT OF STRAIN PHYSICS AND ENGINEERING LABORATORIES (P.E.L.) DSIR

Ice property and strain measurement recordings will be taken of the Erebus Glacier Tongue and strain meters will measure flexural waves generated by vehicles travelling on McMurdo sea ice.

The programme will also involve the establishment of three strain meters to measure the natural oscillations of the Erebus Ice Tongue over a 12 month period. This part of the project will involve placing recording equipment in the Scott Base laboratory and using a wave buoy placed in the sea near the end of the ice tongue in late January.

EVENT 28: PHYSIOLOGICAL ECOLOGY OF GLACIAL MELT-WATERS AND MECHANISMS OF FREEZING TOLERANCES IN ANTARCTIC INVERTEBRATES

Departments of Physiology and Zoology, University of Otago

This programme will study the effects of repeated freezing and thawing on organisms which inhabit the melt waters of protected sites such as Cape Bird.

EVENT 29: HYDROPONIC VEGETABLE PRODUCTION AT SCOTT BASE

Victoria University of Wellington

Not active this season.

EVENT 30: YOUTH GROUP PROGRAMME

Antarctic Division, DSIR

Cancelled

EVENT 31: WORKER VISITORS PROGRAMME

Antarctic Division, DSIR

A number of short term worker visitors from various government departments will visit Scott Base and other N.Z. out stations to service installations and equipment during the summer season.

EVENT 32: VIP VISITS

Antarctic Division, DSIR

Five groups each of four VIPs will visit Scott Base, Vanda Station and other sites of N.Z. scientific activity.

These guests are invited as representatives of the N.Z. Government, the Ross Dependency Research Committee, the N.Z. Universities Vice-Chancellor's Committee and Government Departures with interests in Antarctica.

EVENT 33: GUEST FOREIGN SCIENTISTS WITH THE NEW ZEALAND ANTARCTIC RESEARCH PROGRAMME

Antarctic Division, DSIR

Guest scientists from a number of countries have been invited to participate in the 1983/84 N.Z. Antarctic Research Programme. They will include scientists from the Republic of Brazil, Republic of Uruguay and the Peoples Republic of China. Their participation is to assist research and provide an insight into N.Z. Antarctic operations to foster the spirit of cooperation amongst nations involved or likely to be involved with the planning of Antarctic research.

EVENT 34: CAPE ADARE HUT RESTORATION AND BUILDING CLIMATOLOGY

Canterbury Museum

Cancelled

EVENT 35: MCMURDO SOUND ICEBERG STUDY

Commission for the Environment, and DSIR Physics and Engineering Laboratory

The purpose of this study programme will be to identify the source of icebergs of the coast of Victoria Land to determine the mechanisms by which these bergs decay and to obtain information on any sedimentological material they may carry.

EVENT 36: CAPE HALLETT IMPACT STUDY

DSIR Antarctic Division, U.S. National Science Foundation
Division of Polar Programmes

Representatives of both Antarctic Division and N.S.F. will visit Hallett Station with the intention of spending two/three weeks carrying out an assessment of the condition of the former joint U.S./N.Z. station.

REPORT ON THE NEW ZEALAND ANTARCTIC RESEARCH PROGRAMME 1982/83 SUMMER, 1983 WINTER

SCOTT BASE AND ARRIVAL HEIGHTS

All continuous recording programmes at Scott Base were maintained and involved the disciplines of seismology, meteorology, ionospheric physics, earth currents and geomagnetism.

Throughout the year the independent seismic programme initiated by Dr Philip Kyle of the Institute of Mining and Technology of New Mexico, involving recorders placed on the flanks of Mt Erebus with data transmission to receivers located at Scott Base, continued to operate satisfactorily through the winter. Data analyses to date has revealed a higher incidence of tremors recorded than anticipated.

The Canterbury University D-Region programme installed at Scott Base has been operative throughout the past summer and winter. This long term programme is designed to examine movements of ionisation in the lowest parts of the ionosphere.

Development of the Scott Base rebuilding programme dictated the resiting of some meteorological equipment. Accordingly the annemometer was relocated during the 1982/83 summer season.

Stage 3B of the base rebuilding programme, kitchen and mess block, was completed internally in time for occupation during the early part of the summer season.

Stage 4, command centre outer shell, was erected and closed in and during the winter months has been used as a recreational centre for members of the winter over staff.

A highlight of the summer programme was a week long visit to Scott Base, Vanda Station and a number of scientific programmes in the field by H.R.H. Prince Edward, who was a guest of Antarctic Division, DSIR.

VANDA STATION

Vanda Station operated as a summer support base for scientific parties working in the Dry Valleys region. The station was opened on the 21 October 1982 and closed on 3 February 1983. Staffed by three men throughout the summer season, Vanda Station again provided vital logistics and communications support for field parties and U.S. helicopters operating throughout the region. Of particular importance this year was the relaying role of Vanda in communications between the Terra Nova Bay expedition and Scott Base.

Apart from completing a limited meteorological programme Vanda staff installed additional solar panels which functioned throughout the summer supplying the electrical needs of the base during the season. A works programme was undertaken upgrading living accommodation at Vanda Station and the mess hut was relined and insulated.

FIELD PROGRAMME 1982/83 REPORT

EVENT 1: HYDROLOGY AND GLACIOLOGY — DRY VALLEYS

Ministry of Works and Development.

Ministry of Works and Development scientists continued their monitoring programmes recording both long and short term climatic variations in the Dry Valleys region. They also conducted studies of the flow regime of the Onyx River and carried out lake level measurements of nine Dry Valley lake systems.

Mass balance and ablation measurements were also taken on the Heimdall, Lower Victoria and Lower Wright and Jeremy Sykes Glaciers. On the Heimdall Glacier ice temperatures were measured and analysed to obtain mean annual temperature profiles.

EVENT 2: GEOLOGY OF TERRA NOVA BAY

New Zealand Geological Survey, DSIR

This four man geological expedition was successfully put into the Brown Pass area behind Terra Nova Bay in an open field landing by LC130 ski-equipped Hercules. Despite weather conditions restricting operations the party succeeded in completing detailed geological mapping of the Precambrian and early paleozoic metasedimentary and granitoid rock formations throughout the region.

EVENT 3: BEACON SUPERGROUP COAL STUDIES

New Zealand Geological Survey, DSIR and Antarctic Coal Measures

Study Group of N.S.W., Australia — International Project.

The party of New Zealand and Australian geologists successfully conducted a detailed mapping survey of coal measures found in the Beacon Super Group formation of Shapeless Mountain and Mount Fleming at the head of the Wright Valley, Victoria Land. Early analyses of data and samples collected had indicated that coal measures are not as extensive as previously thought and the quality of the coal deposits is considered to be extremely low.

EVENT 4: VOLCANIC AND SEISMIC STUDIES — MT EREBUS

N.Z. Geological Survey, DSIR, Victoria University of Wellington, Institute of Mining and Technology, New Mexico, University of Alaska, National Institute of Polar Research, Japan — International Project.

The International Mount Erebus Seismic Study (IMESS), although originally conceived as a three year programme has been continued and last season continuous seismic recordings of activity were monitored by technicians at Scott Base.

N.Z. Geological Survey scientists also monitored a network of survey markers around the summit area of Mt Erebus monitoring the nature and rate of deformation of the summit region.

Scientists from the Universities of Canterbury and Melbourne conducted further studies of the warm soil fungi blue/green algae found in the warm soils of the summit area.

Observations were also made from the crater rim of the magma lake and associated eruptive activity.

EVENT 5: MCMURDO SOUND SEDIMENTS

Victoria University of Wellington

The Antarctic Research Unit of Victoria University undertook a series of seismic studies designed to assist in determining drill sites on the edge of McMurdo Sound for the Cenozoic Investigations of the Ross Sea programme (CIROS) scheduled to commence in the 1984/85 season.

The unit also conducted core sampling operations of the McMurdo Sound sea floor and carried out an extraction of large diameter cores from several deep water localities in McMurdo Sound from the U.S.C.G. icebreaker 'Glacier'.

EVENT 6: BEACON SUPERGROUP GEOLOGICAL STUDIES

Victoria University of Wellington

Victoria University's geologists visited the Portal and Bastion Mountain regions, the Miers Valley and Shapeless Mountain investigating the sedimentary structure and establishment of a set of paleo-hydraulic models from Traissic alluvial plain sedimentation in Victoria Land.

Event 7: ISOSTATIC LOADING OF ROSS ISLAND MCMURDO SOUND GEOPHYSICAL SURVEY

Geophysics Division, DSIR

A joint programme with Event 5, gravity, magnetic and seismic soundings were taken on and around the Dailey Islands.

Members of this event also conducted gravity observations and associated seismic sounding along the line between Windless Bight and Minna Bluff. Gravity observations were also made on Ross Island.

EVENT 8: SOIL DEVELOPMENT IN ANTARCTICA

Soil Bureau, DSIR

Two Soil Bureau scientists conducted investigations of soils found to the north of the main McMurdo Oasis, and efforts are now being made to correlate these with soils found in the Asgard Range at the head of the Darwin Glacier.

The team also investigated permafrost and buried soils in the

Asgard Range and samples were collected in the vicinity of Scott Base, principally to assess the effect of human occupation and in particular the build-up of non-degradable materials.

Tests were also carried out during the early part of the season to determine the usefulness of remote sensing and enhanced satellite imagery as a means of predicting the distribution of weathered soils in Antarctica.

EVENT 9: LOGISTICS SUPPORT FOR CENOZOIC INVESTIGATIONS IN THE ROSS SEA (CIROS)

Victoria University of Wellington, Geophysics Division, DSIR Antarctic Division, DSIR

A specialist investigative team made an analyses of suitable base camp sites for the CIROS project and established a programme covering fuel requirements, site buildings, vehicle support and power generation. An assessment was also made of the drill rig and ancilliary equipment to be used in the CIROS programme.

EVENT 10: LOWER TAYLOR VALLEY DRILLING PROJECT

Antarctic Division, DSIR, University of Waikato, U.S. Geological Survey and University of Maine — International Project

A successful programme was completed involving a detailed study of the magnetostratigraphy and sedimentology of the Dry Valleys, which will provide a further understanding of the Cenozoic glacial and climatic history of the region. Using Antarctic Division "Winkie" drill equipment a series of 60m holes were drilled at various locations between New Harbour and Lake Bonney. Waikato University scientists associated with this event also investigated the pattern of salt and nutrient discharge from Canada Glacier.

EVENT 11: SEA-ICE FLOATING GLACIER DYNAMICS

University of Waikato

Scientists from the Physics Department of Waikato University conducted a series of studies on sea-ice dynamics taking strain meter measurements of wave energy in the vicinity of the McMurdo aircraft landing area. They also conducted studies of wave phenomena on the Erebus Glacier Tongue and measurements were also taken of longitudinal oscillations and ice thickness. The group also conducted experiments with the solar energy panel used for irradiation measurements, temperature and energy input.

EVENT 12: MICROBIOLOGY OF DRY VALLEY LAKES

University of Waikato

Biologists from University of Waikato together with a guest scientist from the University of Dundee continued studies of lower plant groups in the Dry Valley ecosystem. These investigations were extended to cover the Dry Valley lakes and the party also made an assessment of the interrelationship between carbon, nitrogen and sulphur metabolism in the eutrophis lakes in the Cape Bird region.

EVENT 13: PLANT ECOLOGY OF SOUTH VICTORIA LAND STREAMS

Ecology Division, DSIR

This event was postponed.

EVENT 14: MEDICAL MICROBIOLOGY

Department of Health.

This event was postponed.

EVENT 15: SOIL MICROBIOLOGY AND BIOCHEMISTRY ORNITHOLOGY

Botany Department, University of Canterbury

University of Canterbury scientists together with guest scientists from the British Antarctic Survey and University of Melbourne conducted microbial, biochemical and physiological studies at Cape Bird and Cape Crozier and also investigated endolithic algae sites in various Dry Valley lakes.

EVENT 16: MARINE BIOLOGY

Zoology Department, University of Canterbury

This event conducted the long term study programme on the marine pelagic and epontic ecosystems in McMurdo Sound.

EVENT 17: INTERNATIONAL SURVEY OF ANTARCTIC SEABIRDS (ISAS)

University of Canterbury, Ecology Division, DSIR

N.Z. biologists continued their contribution to the ISAS programme and conducted the annual penguin census at Cape Bird and Cape Hallett. An aerial photographic survey of Adelie rookeries along the McMurdo and Northern Victoria Land coastlines was completed and a four man expedition at Cape Hallett made a detailed study and took soil samples and guano for subsequent analyses.

EVENT 18: PHYSIOLOGICAL ADAPTATION IN ANTARCTIC FISHES

University of Auckland

The Auckland University research unit conducted their investigation of the metabolism and neurobiology of fish mechanisms involved in cold adaptation.

The party also resampled fish tagged from the previous season, assisting estimation of annual growth rates, population densities and determination of age.

EVENT 19: MCMURDO SOUND PHYTOPLANKTON STUDIES

New Zealand Oceanographic Institute, DSIR

This event was an extension of the 1979/80 programme and continued sampling water column on the McMurdo Sound sea ice, in order to determine the phytoplankton population density and location.

EVENT 20: FLOATANT POLLUTANTS IN THE ROSS SEA

Geology Department, University of Auckland

This project carried out aboard the U.S. icebreaker 'Glacier' voyage between New Zealand and Antarctica used a Neuston net sampling to investigate the extent of floatant pollutants in the Ross Sea.

A number of beaches along the Northern Victoria Land coastline were sampled for floatant litter and oil retention potential. An examination was also made of the geomorphic features of submerged platforms along the coastline.

EVENT 21: DRY VALLEY GEOCHEMISTRY

Japan Polar Research Association
Sponsored by Antarctic Division, DSIR

A four man team of Japanese scientists continued their long established geological and geochemical studies in the Dry Valleys region.

EVENT 22: MANAGEMENT OF HISTORIC SITES IN THE ROSS DEPENDENCY

Antarctic Division, DSIR, National Museum, N.Z. Antarctic Society

Members of this event inspected the Historic Sites in the Ross Dependency with a view to determing a realistic long term management plan for the preservation and restoration of historic sites and also carried out some basic maintenance on the Ross Island historic huts.

EVENT 23: PENGUIN CENSUS CAPE ROYDS

Antarctic Division, DSIR

The annual Cape Royds penguin census was conducted by Scott Base staff.

EVENT 24: SURVIVAL TRAINING

Antarctic Division, DSIR

Three divisional specialist field personnel who were also members of the joint N.Z./U.S. S.A.R. team conducted a series of survival training courses for all members of the N.Z. and U.S. Antarctic Research Programmes. Instruction was also given to aircrew and coastguard personnel and simulated S.A.R. projects were undertaken.

EVENT 25: MCMURDO SOUND SEA-ICE MOVEMENT STUDY

Antarctic Division, DSIR

Throughout the season fortnightly measurements of the McMurdo Sound sea ice growth and movement were taken principally in the regions of Cape Armitage, Butter Point, New Harbour and Marble Point.

EVENT 26: NEW ZEALAND ANTARCTIC RESEARCH PROGRAMME SURVEYORS

Department of Lands & Survey

Two surveyors from the Department of Lands & Survey provided assistance to a number of events throughout the season and conducted lake levelling and surveys as well as providing coordinates for drilling projects. The surveyors also provided assistance to USARP investigators working in the Sollas and Beacon Valley. A number of survey assignments were also completed relating to the Scott Base rebuilding programme.

EVENT 27: REMOTE SENSING — SATELLITE IMAGERY (LANDSAT)

Physics and Engineering Laboratory, DSIR

Within this programme investigations were conducted aimed at refining the reproduction, specific enhancements and uses of Antarctic satellite imagery. During the summer, radio-metric work was carried out in the vicinity of Hut Point Peninsula in coordination with the U.S. receiving station at McMurdo Station.

EVENT 28: PHYCHOLOGICAL STUDIES AND COUNSELLING OF SCOTT BASE WINTER TEAM

Victoria University and Antarctic Division, DSIR

This joint Antarctic Division, Victoria University of Wellington psychological department programme provided an interview and counselling service for Scott Base winter personnel.

EVENT 29: HYDROPONIC VEGETABLE PRODUCTION AT SCOTT BASE

Victoria University of Wellington

Cancelled

EVENT 30: YOUTH GROUP VISIT

Antarctic Division, DSIR

Three representatives of New Zealand youth groups visited Scott Base and a number of field events. The party journeyed south aboard the U.S.C.G. icebreaker and returned to N.Z. by air in early February.

EVENT 31: **WORKER VISITORS**
Antarctic Division, DSIR

A number of short term worker visitors from various N.Z. Government departments visited Scott Base and other out stations to service installations and equipment during the summer season.

EVENT 32: **VIP VISITS**
Antarctic Division, DSIR

Three groups of N.Z. VIPs visited Scott Base and Vanda Station during the season and included the first visit to the Ross Dependency by a member of the Royal Family — H.R.H. The Prince Edward.

EVENT 33: **GUEST FOREIGN SCIENTISTS**
Antarctic Division, DSIR

Guest foreign scientists to work with the N.Z. programme during the 1982/83 season included scientists from the United States, Australia, Japan, Italy and the Peoples Republic of China.

EVENT 34: **DRY VALLEY MAPPING**
N.Z. Department of Lands & Survey and U.S. Geological Survey

A joint U.S./N.Z. survey team completed the 1:50,000 mapping series of the Dry Valleys region.

EVENT 35: **NEW ZEALAND TELEVISION DOCUMENTARY**
Antarctic Division, DSIR and TVNZ, Christchurch

A three man TVNZ film crew visited Scott Base and a number of field events and compiled a series of five programmes for "Science Express".

EVENT 36: **DOG SLEDGING FEATURE FILM**
Antarctic Division, DSIR and Fuji Telecasting Company of Japan

During the early party of the season a Japanese film crew complete filming the Scott Base dog team for a major feature film, simulating events which took place with the Japanese husky population at Syowa Station in 1958.

THE FUTURE

Whilst basic scientific studies continue in the Antarctic there is developing emphasis being directed towards meeting the more specialised demands of man's increasing knowledge of the region, conservation and the balanced utilization of possible resources.

Antarctica has retained its IGY status as a unique natural laboratory where man can study the earth and surrounding space. Equally important the continent continues to be the last relatively undisturbed area on earth from which may also be monitored the effect of man on the remainder of our global environment.

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